REMARKS

I. Introduction

In response to the Office Action dated April 12, 2005, no claims have been cancelled, amended or added. Claims 1-12 remain in the application. Re-examination and re-consideration of the application is requested.

II. Prior Art Rejections

A. The Office Action Rejections

In paragraphs (3) of the Office Action, claims 1, 2, 5, 6, and 9-12 were rejected under 35 U.S.C. §102(e) as being anticipated by La Porta et al., U.S. Patent No. 6,654,359 (La Porta). In paragraph (12) of the Office Action, claims 3, 4, 7, and 8 were rejected under 35 U.S.C. §103(a) as being unpatentable over La Porta in view of Olkkonen, WO 98/43456.

Applicants' attorney respectfully traverses these rejections.

B. Applicants' Independent Claims

Applicants' independent claim 1 is generally directed to an internet protocol-based cellular telephone communications system, comprising:

a router;

a foreign agent (FA), coupled to the router;

a base transceiver station (BTS), coupled to the router, for communicating with a mobile telephone within a transmission area associated with the base transceiver station, wherein the router communicates with the base transceiver station using a cellular network interface; and

a home agent (HA), coupled to the router, wherein the home agent communicates with the router and the foreign agent for registering mobile telephones and transmitting messages using an internet-protocol network separate from the cellular network;

wherein messages are transmitted using the internet protocol network between the home agent and the router, and messages are transmitted using the cellular network interface between the router and the base transceiver station.

Applicants' independent claim 6 is generally directed to an internet protocol-based cellular telephone communications system, comprising:

a handoff server (HS);

a base transceiver station (BTS), coupled to the handoff server, for communicating with a mobile telephone within a transmission area associated with the base transceiver station, wherein the handoff server communicates with the base transceiver station using a cellular network interface; and

a home agent (HA), coupled to the handoff server, wherein the home agent communicates with the handoff server for transmitting messages using an internet-protocol network separate from the cellular network;

wherein messages are transmitted using the internet protocol network between the home agent and the handoff server, and messages are transmitted using the cellular network interface between the handoff server and the base transceiver station.

Applicants' independent claim 12 is generally directed to a method for communicating over an internet protocol-based communications network, comprising:

sending a message from a home agent (HA) to a router over an internet protocol based network;

forwarding the message from the router to a base transceiver station (BTS) using a cellular network interface, wherein the cellular network is not part of the internet protocol based network; and

forwarding the message from the base transceiver station to a mobile telephone that is within a geographical communications zone of the base transceiver station.

C. The LaPorta Reference

La Porta describes domains that are defined to incorporate a subnet including a plurality of base stations and routers. Base stations are used by mobile devices to attach to the wired portion of a packet-based network, such as the Internet, and exchange packets thereover with a correspondent node. Local mobility between domain base stations is provided by including and updating routing table entries at domain routers and base stations for forwarding packets having a mobile device's address as a destination address to the mobile device. Packets are delivered to the mobile device regardless of the domain base station to which the mobile device is attached. When a mobile device is attached to a base station included within a foreign domain, a care-of address is assigned, and packets are tunneled for delivery of packets to the mobile device. Only one care-of address is required per mobile device per foreign domain. Routing table entries used for packet delivery are updated on a purely local subnet basis within domains, whether home domain or foreign domain,

making handoffs between base stations substantially transparent to the home agent and the correspondent node.

D. The Olkkonen Reference

Olkkonen describes a mobile telecommunications network using ATM switching, which has a network element including an ATM switching function, which are controlled with same call and switching control operations as generally used for control of TDM switching field

E. Applicants' Claimed Invention Is Patentable Over The Reference

Applicants' attorney respectfully submits that Applicants' claimed invention is patentable over the cited references. Specifically, Applicants' attorney asserts that the references, taken individually or in combination, do not teach or suggest the specific combination of elements recited in Applicants' claims.

For example, the Office Action states that the limitations of Applicants' independent claims can be found in LaPorta at col. 5, lines 27-36, col. 7, line 60 – col. 8, line 41 col. 33, line 51 – col. 34, line 35, col. 7, line 60 – col. 9, line 15 and col. 2, lines 36-40.

Applicants' attorney disagrees. At the indicated locations, LaPorta merely sets forth the following:

> LaPorta: col. 2, lines 36-40 (actually 33-50)
> Local mobility within a subnet is supported by classifying wireless base stations, and the routers used to forward packets to those base stations, within defined domains. Domains are typically defined to incorporate a subnet having a plurality of base stations. Base stations are used by mobile devices to attach to the wired portion of a packet-based network, such as the Internet, and exchange packets thereover with a correspondent node. A home domain is a subnet in which a domain node hosts a home agent of the mobile device. A foreign domain is any domain to which the mobile device is attached, other than the home domain. Packets sent from the correspondent node to the mobile device have a packet destination address corresponding to the mobile device. The mobile device retains this address for the duration of time it is powered up and attached to the Internet via any base station. Therefore, packets destined for the mobile device are always routed to the home domain corresponding to the mobile device.

> LaPorta: col. 5, lines 27-36 (actually 21-39)
> Also illustrated are routers attached to the Internet 100 used to route packets between the Internet and a plurality of base stations. Specifically, router R1 is shown interfacing routers R2 and R3. Router R2 is shown interfacing base stations BS1 and

BS2. Similarly, router R3 is shown interfacing base stations BS3 and BS4. Within the context of Mobile IP, and throughout the remainder of the description of the present invention, base stations include all of the capabilities associated with conventional wireless base stations, and in addition, include the capabilities associated with conventional routers. This dual-functionality is accomplished with either an integrated router and base station solution, or in the alternative, with separate router and base station components interfaced appropriately to exchange packets between the two. With regard to the latter, the router and base station components are typically co-located within a common facility, although co-location is not a requirement.

LaPorta: col. 7, line 60 – col. 9, line 15

FIG. 2 illustrates the domain-based architecture for a Handoff-Aware Wireless Access Internet Infrastructure (HAWAII), in accordance with the present invention. In order to implement HAWAII, the wired access portion of the wireless network is divided into domains, each domain having a common root router through which all packets destined for mobile users connected to a base station within that domain are forwarded. Specifically, shown in FIG. 2 is a wired access portion of a wireless network divided into two domains, Domain1 and Domain2. Domain1 is comprised of a root router through which all packets destined for mobile devices connected to base stations BS5, BS6, or BS7 are routed. Illustratively, routers R4 and R5 are shown as downstream routers utilized within Domain1 to forward packets to the appropriate base station. It is assumed, in this exemplary embodiment, that Domain1 is defined to encompass a subnet representing the home domain servicing a mobile device 114. A home agent 152 is incorporated at root router 150. Although the instant embodiment is illustrated and described as having the home agent 152 implemented within the root router 150 utilizing the capabilities of the processor and memory residing in root router 150, it would be apparent to those skilled in the art to alternatively implement the home agent 152 using a separate co-located processor and memory, such as that available in a personal computer. Furthermore, the home agent need not be implemented in conjunction with the root router at all; that is, the home agent may be implemented in any local router or node capable of communicating with the other routers (including base stations) within the home domain. Domain2 is presented as an exemplary subnet representing a second domain servicing base stations not incorporated within Domain1. Domain2 is therefore representative of a foreign domain. Incorporated within Domain2 are a plurality of routers servicing one or more base stations. For illustrative purposes only, router R6 is shown as a root router for Domain2 and BS8 is shown as one of the base stations serviced through the routers of Domain2. It should also be noted that router R6 may be enabled with home agent and root router functionality for those mobile devices having Domain2 as their assigned home domain, thus Domain2 would be a foreign domain to those mobile devices having home agent functionality residing within root router 150, whereas Domain2 would concurrently be a home domain to those mobile devices having home agent functionality residing within router R6 (not shown). Each subsequent domain (no others illustrated in FIG. 2) provides Internet access for one or more base stations attached to the Internet 100 through a common root router.

As a mobile user operating a mobile device 114 moves about within a domain, whether within the home domain or a foreign domain, the mobile device's IP address remains unchanged. For instance, assuming that a mobile device 114 is first serviced by base station BS5 and is then handed off to base station BS6 and then to BS7, the mobile device's IP address remains the same. The home agent for the mobile user and the correspondent node are shielded from the user's mobility while the device is connected through any base station within that domain. Establishing packet delivery to the mobile device from a new base station within a domain is accomplished by using a specialized path setup scheme, subsequently described, which updates selected host based routing tables in selected routers within the domain. Advantageously, since each domain is identified as a local subnet, there are no changes or updates required to the routing entries in the backbone routers outside of each domain. This method is distinctly different from the method used for the Route Optimization extension to Mobile IP, previously described, in which the mobile device's care-of address is changed each time the mobile device is handed off between neighboring base stations, but routing entries contained within individual routers remain unchanged.

When a mobile device 114 changes its point of attachment from a base station associated with a first domain (with the first domain being either the home domain or a foreign domain) to a base station associated a second domain (with the second domain being any foreign domain, but not the home domain, since tunneling is not required when a mobile device's point of attachment is from any base station included within the home domain), packets are forwarded to the mobile device in the new (second) domain, from the home agent, using a protocol for packet tunneling, one such protocol being Mobile IP. For example, if mobile device 114 is handed off from base station BS7 (wired to the Internet through Domain1) to base station BS8 (wired to the Internet through Domain2), then the home agent 152 at the root router 150 in the home domain (Domain1) begins encapsulating packets and tunnels them to the new care-of address obtained by the mobile device when handed off to a Domain2 base station. Thus, applications can continue to use the same IP address without disruption.

LaPorta: col. 33, line 51 – col. 34, line 35

FIG. 19 is a diagram illustrating the Mobile IP standard method utilized for tunneling IP packets from a mobile device's home agent to the mobile device's foreign agent. Packets launched from a correspondent node 600 for delivery to a mobile device 608 are first routed to a node hosting the home agent 602 of the mobile device 608. The home agent 602 is a registered agent for the mobile device 608 to which all packets having the mobile device's IP address as a destination address are first routed. The path between the correspondent node 600 and the home agent 602 is not shown in its entirety. The Internet, private intranets, and/or a plurality of routers and nodes may be interposed between the correspondent node 600 and the home agent 602. The home agent 602, upon receiving a packet having the mobile device's IP address as a destination address forwards the packet to the mobile device's foreign agent 610, which in the instant embodiment is shown co-located at the mobile device 608. The mobile device 610 is shown maintaining an established a wireless connection with a base station 606. A router 604 is shown

interposed between the base station 606 and the home agent 602. The tunneling path between the home agent 602 and the mobile device 610 is not shown in its entirety. The Internet, private intranets, and/or a plurality of routers and nodes may be interposed between the home agent 602 and the mobile device 608.

An IP packet 612 conveyed from the correspondent node 600 for delivery to the mobile device 608 is first received at a node hosting the home agent 602. The IP packet 612 is typically limited in size, 1500 bytes in the instant embodiment. Of the 1500 bytes, 40 bytes are utilized for the IP packet header. The correspondent node is set as the IP header source address 614 and the mobile device is set as the IP header destination address 616. A total of 1460 bytes is available for data payload 618. Once received at the node hosting the home agent 602, the home agent intercepts the IP packet 612 on behalf of the mobile device 608, encapsulates the IP packet 612 with appended IP header destination and source addresses, and forwards the encapsulated packet 620 in an IP-in-IP tunnel to the foreign agent 610 co-located at the mobile device 608. The encapsulated packet is therefore comprised of the original 40 byte IP header which included the correspondent node IP address 626 and the mobile device IP address 628, a ten byte appended IP header source address 622 designated with the home agent's IP address, a ten byte appended IP header destination address 624 designated with the foreign agent's IP address, and a total of 1440 bytes available for data payload 630. When a tunneled encapsulated packet 620 is received at the foreign agent 610, the foreign agent strips the appended IP header source and destination addresses 622,624 and delivers the remainder of the packet to the mobile device 608 for processing.

With regard to Applicants' independent claims, the above portions of LaPorta do not describe an internet protocol-based cellular telephone communications system. Instead, the above portions of LaPorta refer to a mobile Internet Protocol (IP) network, e.g., a packet data network. See, e.g., col. 1, line 19, which states "[t]he present invention relates to the Internet and other packet-based networks and more particularly to methods for wireless access to packet-based networks by mobile devices."

Moreover, the above portions of LaPorta do not describe a router or handoff server that communicates with a base transceiver station using a cellular network interface. In addition, the above portions of LaPorta do not describe a home agent that communicates with the router and the foreign agent or handoff server using an internet-protocol network separate from the cellular network. Finally, the above portions of LaPorta do not describe that messages are transmitted using the internet protocol network between the home agent and the router or handoff server, and messages are transmitted using the cellular network interface between the router or handoff server and the base transceiver station.

Indeed, nowhere is a cellular network that is not part of the internet protocol (IP) based network described in LaPorta. Instead, the discussion in LaPorta concerns only "packet data" and

the connection of "mobile devices" to "corresponding nodes" on a packet network, but not circuit-switched "voice calls" by "mobile telephones" in "cellular telephone communications networks."

Olkkonen does not overcome these deficiencies of LaPorta. Recall that Olkkonen was cited only against Applicants' dependent claims, and only for teaching the use of ATM in cellular telephony. Thus, even when combined, LaPorta and Olkkonen do not teach all the elements of Applicants' claims.

Moreover, the various elements of Applicants' claimed invention together provide operational advantages over LaPorta and Olkkonen. In addition, Applicants' invention solves problems not recognized by LaPorta and Olkkonen.

Thus, Applicants' attorney submits that independent claims 1, 6, and 12 are allowable over the references. Further, dependent claims 2-5 and 7-11 are submitted to be allowable over the references in the same manner, because they are dependent on independent claims 1, 6, and 12, respectively, and thus contain all the limitations of the independent claims. In addition, dependent claims 2-5 and 7-11 recite additional novel elements not shown by the references.

III. Conclusion

In view of the above, it is submitted that this application is now in good order for allowance and such allowance is respectfully solicited. Should the Examiner believe minor matters still remain that can be resolved in a telephone interview, the Examiner is urged to call Applicants' undersigned attorney.

Respectfully submitted,

GATES & COOPER LLP
Attorneys for Applicants

Howard Hughes Center
6701 Center Drive West, Suite 1050
Los Angeles, California 90045
(310) 641-8797

Date: July 12, 2005

By: _____
Name: George H. Gates
Reg. No.: 33,500

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